

## PVM-X2400



**\* Product update: see below for advanced information on the PVM-X2400 V2 upgrade model**

**4K HDR picture monitor colour-matches with the BVM-HX310 master monitor, ideal for 4K and HD productions**

The PVM-X2400 is a 24-inch 4K HDR high grade picture monitor, incorporating a Sony-specified premium LCD panel that offers 1000 cd/m<sup>2</sup> luminance and colour matching with the BVM-HX310 4K HDR master monitor. This makes group monitoring easy for on-set, studio and truck applications, and in 19" EIA racks for editing, audio mixing etc.

**TRIMASTER assures accurate colour reproduction, precise imaging and consistent picture quality**

Sony's acclaimed TRIMASTER architecture delivers accurate picture reproduction, precise imaging and quality picture consistency. There are many advantages in the panel control and signal processing system such as fast processing, accurate linearizing of an input signal with Optical Electrical Transfer Function, accurate colour reproduction, etc.

**Future HDR-SDR conversion support**

With future V2.0\* firmware and the optional PVML-HSX1, HDR-SDR conversion license, the PVM-X2400 will support HDR-SDR conversion in live production environments. The license will activate: 4K to HD down-conversion, colour space conversion, OETF conversion, Progressive to Interlace conversion and Quad-link 3G to Single-link 12G conversion. It will also allow the output of converted pictures to other 4K or HD monitors via the Enhanced Monitor Output. This planned feature will facilitate local or remote monitoring of converted signals. The license activation will be field upgradeable via USB memory, providing conversion capabilities to a current PVM-X2400 monitor (upgraded to V2.0\* firmware)

\* A V2.0 firmware update will be available at a later date. V1.0 firmware will be upgradable to V2.0 or higher via the monitor's USB port.

**Future User 3D LUT signal output support**

The future V2.0\* firmware and the optional PVML-HSX1 HDR-SDR conversion license will also support the output of signals with applied User 3D LUTs via the Enhanced Monitor Output to other 4K/HD devices further facilitating efficient workflows in live production, cinema, drama, commercial, music and documentary production environments.

\* A V2.0 firmware update will be available at a later date. V1.0 firmware will be upgradable to V2.0 or higher via the monitor's USB port.

### **SR Live metadata**

Planned as a standard feature for V2.0\* release, will be support for SR Live metadata which will enable the PVM-X2400 monitor settings to be matched to the incoming signal. This will help to streamline use of the monitor in SR Live workflows.

\* A V2.0 firmware update will be available at a later date. V1.0 firmware will be upgradeable to V2.0 or higher via the monitor's USB port.

### **Dynamic Contrast Drive and Black Detail High/Mid/Low**

Dynamic Contrast Drive is a new backlight control system that dynamically changes the panel's backlight luminance to adapt to changing content enabling you to confirm the total balance of highlights and low lights at a glance. The feature can be used to reproduce black representation in dark content, such as night scenes and provide specular highlights in bright content such as snow field and summer beach scenes. The Dynamic Contrast Drive feature provides a dynamic contrast ratio of 1,000,000:1.

Due to the inherent nature of LCD panels, some backlight leakage is unavoidable. To compensate, Black Detail Mode High/Mid/Low facilitates more accurate monitoring of black detail in dark, low- APL (average picture level) images. The backlight level is reduced but gamma is maintained for correct colour and grey scale. High luminance areas may be clipped due to the dynamic range of the monitor. Any clipped portions can be displayed as clipped or highlighted by a zebra pattern.

### **Inputs for 12G-SDI and Quad-Link 3G-SDI to HD-SDI as well as HDMI**

The PVM-X2400 provides 12G-SDI inputs, and can accept quad-link 3G-SDI and a single HD-SDI from traditional devices. The monitor also supports an HDMI connection for display of inputs with signal formats ranging from 640x480/60P PC up to 4096x2160/60P 4:2:2 YCBCR 12bit.

### **Various scopes**

A waveform monitor and vector scope can be simultaneously displayed with scales for both HDR and SDR, supporting signal confirmation of both input signal level and output luminance. There are three different displays for luminance, RGB/YCBCR parade or RGB overlay with the gamut error display. The waveform of a specified line can also be displayed.

Furthermore, with future V2.0\* firmware, a colour gamut scope will be available that maps colours in the CIE1931 standard chart with the standard colour space area display.

\* A V2.0 firmware update will be available at a later date. V1.0 firmware will be upgradable to V2.0 or higher via the monitor's USB port.

### **Unique quad view display with User 3D LUT**

The PVM-X2400 provides a quad view display, with individual settings for EOTF (SDR/HDR), colour space, transfer matrix, colour temperature, contrast, brightness, SDI/HDMI, RGB/YCBCR, as well as User 3D LUTs for each display view.

With the future V2.0\* firmware, this function will be enhanced to also support the display of scopes when monitoring in Triple or Dual picture modes.

\* A V2.0 firmware update will be available at a later date. V1.0 firmware will be upgradable to V2.0 or higher via the monitor's USB port.

### **Enhanced user interface and channel select button**

The monitor's OSD (On Screen Display) has been significantly enhanced to make operation faster and more intuitive. The new design enables review and quick adjustment of settings. The Channel select button protects users from making

inadvertent setting errors.

### **Optimised features for field operation**

The PVM-X2400 is specially designed for field operations with a lightweight construction and handles (included) for portability. DC 24V operation allows field-based operation, despite the monitor's large 24" screen size and high 1000 cd/m<sup>2</sup> luminance. An optional protection panel\* protects the premium LCD screen from inadvertent shocks. Yoke-mounting is also supported. Field operation is further enhanced by false colour and camera focus functions\*\*. The false colour feature assigns the in-coming signal different colours for different exposure levels, providing a fast and effective tool for verifying exposure. The Focus Assist feature displays incoming images with sharpened edges to help determine camera focus. The sharpened edges can be displayed in user-selectable colours (white, red, green, blue, and yellow) for more precise focusing.

\* The optional protection panel cannot be used during monitor operation to protect screen from backlight heat.

\*\* Supported with V2.0. A V2.0 firmware update will be available at a later date. V1.0 firmware will be upgradable to V2.0 or higher via the monitor's USB port.

### **Various mount capabilities**

Despite its large 24-inch screen size, the PVM-X2400 can be installed in a 19-inch EIA standard rack in studio and OB van environments. Yoke-mount and wall mount options are also available for installation in a C stand for field use, or on a desktop arm for editing.

### **Powerful stereo sound with audio muting**

The PVM-X2400 incorporates stereo speakers (2W+2W) with audio muting.

### **24-inch 4K premium LCD panel for faithful colour matching with the BVM-HX310**

The PVM-X2400 features a 24-inch 4K premium LCD panel (3840 x 2160 pixel resolution) with a wide colour gamut, high luminance, high contrast, fine grey scale, wide viewing angle and excellent uniformity. The Sony-specified panel supports a 1000 cd/m<sup>2</sup> luminance and offers the same colour gamut as Sony's flagship BVM-HX310 Master Monitor. This provides accurate colour matching within the production workflow from acquisition to finishing for live productions, TV programs, documentaries, music videos, movies, dramas and commercials. All personnel working on a project can reliably share the same accurate view of colours and tones, even if they are working at different locations and times.

### **TRIMASTER assures accurate colour reproduction, precise imaging and consistent picture quality**

Sony's TRIMASTER architecture offers accurate picture reproduction, precise imaging and quality picture consistency. The panel's control and signal processing system offers significant advantages including fast processing, accurate colour reproduction and accurate linearising of input signals with Optical Electrical Transfer Function.

### **HDR-SDR Conversion support**

With the future V2.0\* firmware and the optional PVML-HSX1, HDR-SDR conversion license\*\*, the PVM-X2400 will also support HDR-SDR conversion in a live production environment. The HDR license will support any of the following:

- 4K to HD down-conversion
- Colour space conversion from ITU-R BT.2020 to ITU-R BT.709,

- OETF conversion from HDR OETF S-Log3(HDR), ITU-R BT.2100(HLG), SMPTE ST2084 to SDR EOTF 2.4 and OETF 0.45.
- Progressive to interlace conversion
- Quad-link 3G to single-link 12G conversion

It will also allow the output of converted signals to other 4K or HD monitors via the Enhanced Monitor Output that supports 12G/6G /3G/HD-SDI, even if an original 4K source is Quad link 3G-SDI. This planned feature will enable local or remote monitoring of converted signals. The license activation will be field upgradeable via USB memory, providing conversion capabilities to current PVM-X1800/2400 monitors.

\* A V2.0 firmware update will be available at a later date. V1.0 firmware will be upgradeable to V2.0 or higher via the monitor's USB port.

\*\*The PVML-HSX1, HDR-SDR conversion license, will be sold separately. The monitor must be updated to V2.0 firmware or later. HDR-SDR conversion is activated via the USB port on the front control panel of the monitor.

### **SR Live metadata**

Planned as a standard feature for the V2.0\* release, will be support for SR Live metadata which will enable the PVM-X2400 monitor settings to be matched to the incoming signal. This will help to streamline use of the monitor in SR Live workflows.

\* A V2.0 firmware update will be available at a later date. V1.0 firmware will be upgradeable to V2.0 or higher via the monitor's USB port.

### **Dynamic Contrast Drive**

Dynamic Contrast Drive is a new backlight control system that dynamically changes the panel's backlight luminance to adapt to changing content enabling you to confirm the total balance of highlights and low lights at a glance. The feature can be used to reproduce black representation in dark content, such as night scenes and provide specular highlights in bright content such as snow field and summer beach scenes. The Dynamic Contrast Drive feature provides a dynamic contrast ratio of 1,000,000:1.

### **Black Detail High/Mid/Low**

Due to the inherent nature of LCD panels, some backlight leakage is unavoidable. To compensate, Black Detail Mode High/Mid/Low facilitates more accurate monitoring of black detail in dark, low- APL (average picture level) images. The backlight level is reduced but gamma is maintained for correct colour and grey scale. High luminance areas may clip due to the dynamic range of the monitor. Any clipped portions can be highlighted by zebra patterns or simply displayed as clipped.

### **Versatile 4K video input capability**

The PVM-X2400 is equipped with built-in standard input interfaces: (12G/6G/3G/HD-SDI) BNC (x2), (3G/HD-SDI) BNC (x2) and HDMI (HDCP2.3/1.4) (x1). 12G simplifies wiring, from simple to large-scale field systems. Quad-link 3G-SDI is highly convenient for systems configured with 'traditional' devices. HDMI simplifies interfacing with devices including rasterizers, multi-viewers, digital cameras, set top boxes, UHD Blu-ray players, PCs etc.

### **Various signal settings and automatic setting via Video payload ID**

Though the PVM-X2400 monitor supports manual input signal settings, the monitor also supports VPID (Video Payload ID). This support means that the monitor can auto detect and identify incoming video signals and automatically adjust the monitor settings (EOTF, colour space, RGB source information, etc.) to the input signal, reducing the risk of human error in high pressure live production environments.

### **Enhanced user interface**

The OSD (On Screen Display) menu structure is significantly enhanced from existing Sony 4K monitors. It features a shallow layered structure for quick, easy review and adjustment of setting values. The status menu position has changed from the monitor's top to lower side. 4K/2K settings and input settings/user presets have been streamlined to a single channel. 30 custom channels can be created and renamed as needed. A new channel button on the front control panel facilitates fast setting changes – simply select a channel from the list showing the channel name, colour space, EOTF and input etc. Channels can also be assigned to a Function key. When multiple users share the same monitor, each user can save their own setting data to a channel and retrieve it whenever required, thus reducing consuming and repetitive setting tasks. All monitor data can be saved and locked by a password. Users can freely change stored values, but data cannot be overwritten or saved to memory by a user without the password. For improving Function key configuration setup, users can take a short-cut to the settings menu screen by simply pressing the Function key repeatedly. Function key preset allows the creation, storage and quick recall of different key combinations. Channel, function key preset, colour temperature and marker parameters can be assigned custom names from the monitor's OSD keyboard.

#### **4K/HD scopes with HDR/SDR scale and audio level meter display**

Both the waveform monitor and vector scope can be simultaneously displayed with scales for either HDR or SDR. Scales are automatically changed according to the selected EOTF setting of the monitor. You can easily check both input signal level and output luminance using the HDR scale of the WFM. The waveform vector scope offers two zoom modes: one in an area of either 0 - 20% or 0 - 30% within the waveform monitor, and a second, in the central black area of the vector scope, for adjusting camera white balance. The waveform has three different displays of either luminance, RGB/YCBCR parade or RGB overlay with gamut error display. The waveform of a specified line can also be displayed. In addition, an audio level meter can display eight channels of embedded audio from the SDI or HDMI input. (Ch1-8 or Ch9-16). Furthermore, with future V2.0\* firmware, a colour gamut scope will be available that maps colours in the CIE1931 standard chart with the standard colour space area display. The colour space area display is automatically set and displayed according to the selected colour space setting from ITU-R BT.2020, DCI-P3, S-Gamut3, S-Gamut3.Cine to ITU-R BT.709. It can also be displayed with the other scopes at the same time.

\* A V2.0 firmware update will be available at a later date. V1.0 firmware will be upgradeable to V2.0 or higher via the monitor's USB port.

#### **User 3D LUT**

User 3D LUT files can be loaded to internal memory via the USB port at the front of monitor. 33 grid points or 17 grid point .cube files are supported. Different user LUTs can be easily selected and compared in Quad View display.

The future V2.0\* firmware and the optional PVML-HSX1, HDR-SDR conversion license, will also support the output of signals with applied User 3D LUTs via the Enhanced Monitor Output to other 4K/HD devices further facilitating efficient workflows in live production, cinema, drama, commercial, music and documentary production environments.

\* A V2.0 firmware update will be available at a later date. V1.0 firmware will be upgradeable to V2.0 or higher via the monitor's USB port.

#### **Unique Quad View display**

The PVM-X2400 provides a Quad View display mode with individual settings of EOTF (SDR/HDR), colour space, transfer matrix, colour temperature, contrast, brightness, user LUT, SDI/HDMI and RGB/YCBCR for each display view. Different HD input sources

can be compared as a part of an HD wall system.

With the future V2.0\* firmware, this function will be enhanced to also support the display of scopes when monitoring in Triple or Dual picture modes.

For example, you could monitor two HD videos on the upper quadrants and the corresponding waveform monitors, vector scopes and colour gamut scopes on the lower quadrants at the same time.

\* A V2.0 firmware update will be available at a later date. V1.0 firmware will be upgradeable to V2.0 or higher via the monitor's USB port.

#### **False colour function**

One of the features planned for V2.0\* firmware is False Colour whereby the in-coming signal is assigned different colours for different exposure levels, providing a fast and effective tool for verifying exposure.

\* A V2.0 firmware update will be available at a later date. V1.0 firmware will be upgradeable to V2.0 or higher via the monitor's USB port.

#### **Camera focus function**

A Focus Assist feature (also planned for V2.0\* firmware) displays incoming images with sharpened edges to help determine camera focus. The sharpened edges can be displayed in user-selectable colours (white, red, green, blue, and yellow) for more precise focusing.

\* A V2.0 firmware update will be available at a later date. V1.0 firmware will be upgradeable to V2.0 or higher via the monitor's USB port.

#### **DC operation**

The PVM-X2400 can be powered by a DC 22 V - 32 V source, providing more flexibility and mobility for users who want a larger size screen for on-set and field applications.

#### **Highly reliable mechanical design, optional protection panel and 19-inch EIA standard rack-mount capability**

For long term reliability, Sony conducted multiple thermal simulations to find the most efficient cooling system and mechanical structure. Long-term heat load tests were also conducted to meet stringent specifications.

The optional PVMK-PX24 protection panel safeguards the PVM-X2400 screen from inadvertent scratches and impacts during transportation and preparation\*. The protection panel can be easily attached or detached without tools. This protection panel can be mounted together with the rack-mount bracket PVMK-RX24, for installation in a 19-inch EIA standard rack.

\* Optional protection panel cannot be used with the monitor in operation in order to protect screen from LCD backlight heat.

#### **Yoke-mount and wall-mount capability**

The PVM-X2400 has screw holes on its side bezels for yoke-mounting. This type of mounting is convenient when installing a monitor on a camera crane or monitor stand in the field. There are also wall-mount 100-mm pitch holes on the monitor's rear panel.

#### **Room clearance connector panel design**

The rear connector panel allows adequate cord clearance. This design allows protecting connectors, space saving and cabling flexibility with easy identification of the connectors for system integration and maintenance.

#### **4K (4096 x 2160) and 2K (2048 x 1080) input**

The PVM-X2400 can display 4K and 2K input signals. The 4K/2K signal can be displayed in two ways: as a full 4K/2K image scaled into a QFHD (3840 x 2160) screen, or as a 4K/2K native display with side cut.

**Flexible and variable area markers, aspect marker and centre marker**

It's easy to set two flexible area markers or variable area markers, and an aspect marker on the screen. Line colours and thickness are customisable. This second marker enables checking of centre focus. Flexible area markers can be used as a screen layout guide for shopping programs or as guides for programs requiring different aspect ratios for distribution.

**Power-on setting**

Ideal for rental applications, the power-on setting quickly loads data at start-up including last memory, user preset factory preset settings.

**Optimised low-latency I/P conversion**

The monitor's low latency I/P conversion system optimizes signal processing according to input signals. This helps with editing and monitoring fast-moving images, and with synchronizing audio with lip sync.

**Zoom function**

The PVM-X2400 can magnify the centre of the screen for checking camera focus.

**Stereo speakers (2W+2W) with audio muting**

Monitor use on-set or in a machine room requires high sound pressure levels due to environmental noise. 2W+2W front stereo speakers offer powerful sound with a true stereophonic effect. Pressing an assigned Function key can instantly mute audio when required.

**Extensive basic functions**

The monitor has basic functions such as contrast, brightness, chroma, aperture, audio volume, blue only, mono, scan, marker, timecode display, RGB cut off, on-screen tally, BKM-17R control and parallel remote (Fixed pin assignment).

**Picture Performance**

Panel	α-Si TFT Active Matrix LCD
Picture Size (Diagonal)	610.0 mm (24 inches)
Effective Picture Size (H x V)	531.6 x 299.1 mm (21 x 11 7/8 inches)
Resolution (H x V)	3840 x 2160 pixels
Aspect	16:9
Pixel efficiency	99.99%
Display colours	Approx. 1.07 billion colours
Panel frame rate	48 Hz / 50 Hz / 60 Hz (48 Hz and 60 Hz are also compatible with 1/1.001 frame rates)
Viewing angle (panel specification)	89°/89°/89°/89° (up/down/left/right contrast > 10:1)
Normal scan	0% scan

Underscan	3% underscan
Colour temperature	D60, D65, D93, DCI*1, and user 1-10 (5,000 K to 10,000 K adjustable)
Luminance (panel specification) (typical)	1000 cd/m <sup>2</sup> *2
Colour space (Colour gamut)	ITU-R BT.2020*3, ITU-R BT.709, DCI-P3*3, S-GAMUT3*3, S-GAMUT3.Cine*3
Transmission Matrix	ITU-R BT.2020 (Non-constant luminance is supported), ITU-R BT.709
EOTF	2.2, 2.4, 2.6, 2.4 (HDR), S-Log3, S-Log3 (Live HDR), SMPTE ST 2084, ITU-R BT.2100 (HLG)
Warm-up time	Approx. 30 minutes To provide stable picture quality, turn on the power of the monitor and leave it in this state for more than 30 minutes.

## Input

SDI	(12G/6G/3G/HD-SDI) BNC (x2), (3G/HD-SDI) BNC (x2), Input impedance: 75 Ω unbalanced
HDMI Input	HDMI (HDCP2.3/1.4) (x1)
Parallel Remote	RJ-45 8-pin (x1) (Fixed pin assignment)
Serial Remote (LAN)	Ethernet, 10BASE-T/100BASE-TX RJ-45 (x1)
DC Input	XLR-type 3-pin (male) (x1), DC 22 V to 32 V (output impedance 0.05 Ω or less)
USB input	USB (USB2.0) connector (x1)

## Output

Enhanced Monitor Output*4	(12G/6G/3G/HD-SDI) BNC (x1), Output impedance: 75 Ω unbalanced
SDI Output	(12G/6G/3G/HD-SDI) BNC (x2), (3G/HD-SDI) BNC (x2), Output impedance: 75 Ω unbalanced
Audio Monitor Output	Stereo mini jack (x1)
Speaker (Built-in) Output	2.0 W+2.0W (Stereo)
Headphone Output	Stereo mini jack (x1)

## General

Power Requirements	AC 100 V to 240 V, 2.6 A to 1.0 A, 50/60 Hz DC 22 V to 32 V, 9.9 A to 6.3 A  Approx. 225 W (Maximum at AC operation)
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Power consumption	Approx. 205 W (Maximum at DC operation) 0.3 W in off-mode (When the Power switch is off)
Operating Temperature	0°C to 35°C (32°F to 95°F) Recommended: 20°C to 30°C (68°F to 86°F)
Operating Humidity	30% to 85% (no condensation)
Storage / Transport Temperature	-20°C to +60°C (-4°F to +140°F)
Storage / Transport Humidity	0% to 90%
Operating / Storage / Transport Pressure	700 hPa to 1060 hPa
Dimensions (W x H x D)	568 x 382 x 158.5 mm*5 (22 3/8 x 15 1/8 x 6 1/4 inches) (without monitor stand) 568 x 398 x 178.5 mm*5 (22 3/8 x 15 3/4 x 7 1/8 inches) (with monitor stand)
Mass	Approx. 10.5 kg (23 lb 2.4 oz)
Supplied Accessories	AC power cord (1), AC plug holder (1), CD-ROM (1), Before Using This Unit (1)
Optional Accessories	PVMK-RX24 Rack-mounting bracket PVMK-PX24 Protection Panel BKM-17R

### Notes

*1	DCI: x=0.314, y=0.351
*2	The luminance value is typical at D65(x=0.313, y=0.329) and not guaranteed.
*3	The PVM-X2400 does not cover selected colour space in full.
*4	A V2.0 firmware update will be available at a later date. V1.0 firmware will be upgradeable to V2.0 or higher via the monitor's USB port.
*5	Without projecting parts.



